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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Application Number: 09/409,644
Filing Date: October 01, 1999
Appellant(s): LEWIS ET AL.

Joseph R. Baker, Jr.
For Appellant

SUPPLEMENTAL EXAMINER'S ANSWER

This is in response to the Reply Brief filed May 10, 2007. The new ground of rejection applied in the Examiner's Answer has been dropped as a result of the Reply Brief. There have been no changes to the art rejection repeated below as a result of the Reply Brief.

(1) *Real Party in Interest*

A statement identifying the real party in interest is contained in the brief filed November 13, 2006.

(2) *Related Appeals and Interferences*

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) *Status of Claims*

The statement of the status of the claims contained in the brief, filed November 13, 2006, is correct.

(4) *Status of Amendments After Final*

The Appellant's statement of the status of amendments after final rejection contained in the brief, filed November 13, 2006, is correct.

(5) *Summary of Claimed Subject Matter*

The summary of claimed subject matter contained in the brief, filed November 13, 2006, is correct.

(6) *Grounds of Rejection to be Reviewed on Appeal*

The Appellant's statement of the grounds of rejection to be reviewed on appeal in the brief, filed November 13, 2006, is substantially correct. The changes are as follows: the new ground of rejection in the examiner's answer mailed March 19, 2007 and one ground of rejection have been withdrawn by examiner. Additionally, the Stetter reference has been withdrawn from the remaining art rejections.

NEW GROUND(S) OF REJECTION

This supplemental examiners answer does not contain a new ground of rejection.

WITHDRAWN REJECTIONS

The following grounds of rejection are not presented for review on appeal because they have been withdrawn by the examiner. The rejection of claim 158 under 35 U.S.C. 112 second paragraph and the rejection of claims 98-110, 112-123, and 126-159 for obviousness-type double patenting with a patent. The Stetter reference has been withdrawn from the combination of references used to show the obviousness of claims 98-110, 112-123, and 126-159. It is also noted that the explanation of the de Lacy Costello reference has been withdrawn from the explanation below since it appears to have been inadvertently left in the explanation at the time of the final rejection.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief, filed November 13, 2006, is correct.

(8) Evidence Relied Upon

The following is a listing of the evidence (e.g., patents, publications, Official Notice, and admitted prior art) relied upon in the rejection of claims under appeal.

WO 96/07901 Gibson et al. (Gibson) March 14, 1996
Barisci et al. (Barisci) Trends in Polymer Science 1996, 9, 307-311.
Casella et al. (Casella) Analytica Chimica Acta 1996, 335, 217-225.
Thackeray et al. (Thackeray) Journal of Physical Chemistry 1986, 90, 6674-6679.
Yamato et al. (Yamato) Synthetic Metals 1997, 87, 231-236.
DE 3728452 A1 Naarmann et al. (Naarmann) March 9, 1989
Li et al. (Li) Materials Research Society Symposium Proceedings, 1995, 369, 581-585.
JP 4-2958 Sakaguchi et al. (Sakaguchi) January 7, 1992
Wampler et al. (Wampler) J. Mater. Res. 1995, 10, 1811-1822.
Breheret et al. (Breheret) Bioflavor 1995, 75, 103-107.
US 5,801,297 Mifsud et al. (Mifsud) September 1, 1998
WO 95/08113 Mifsud et al. (Mifsud) March 23, 1995 (US 5,801,297 is an
English language equivalent/translation and was treated as such by examiner)
Moy et al. (Moy) Bioflavor 1995, 75, 55-58.
WO 86/01599 Persaud et al. (Persaud) March 13, 1986

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claims 98-110, 112-113, 115, 117-123, 126-135, 137, 139-157 and 159 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gibson in view of Barisci (Trends in Polymer Science, 1996) and Casella, Thackeray, Yamato, Naarmann (DE 3,728,452), Li (Materials Research Society Symposium Proceedings, 1995), Sakaguchi (JP 4-2958) or Wampler. In the patent application Gibson teaches an odor sensor. Page 1 teaches that sensors are important for a variety of applications including food freshness, headspace analysis and detection and quantification of bacteria (micro-organisms). The page also teaches that the a personnel recognition sensor described includes a multiplicity of differentially responding chemo-resistor elements (a plurality or an array of sensors); a detector responsive to signals provided by the multiplicity of elements and arranged to provide an output signal characteristic of the multiplicity of signals; and a housing with the elements disposed therein having an inlet arranged so that a gaseous sample passing into or through the inlet contacts all of the elements in use (see each of the independent claims). Each element has a non-conductive substrate, a plurality of electrodes disposed on the substrate and one or more layers of a conductive polymer overlaying the electrodes, with the conductive polymers of at least two of the elements being different. The page also teaches that the sensors have been prepared on interdigitated gold electrodes (page 5) by polymerizing a number of monomers using chemical or electrochemical techniques; the polymers produced are electrically conducting and have varying sensitivities to volatile odor compounds; and the interaction between an odor compound and a conducting polymer is detected by a change in the electronic characteristics particularly the **resistance, impedance, reactance or capacitance** (instant claims 115,134,137,157) of the polymer film, which may be indirectly measured using changes in the applied potential or current. Page 2 teaches that the sensor may also include a memory (instant claim 150) adapted to store a library of odor profiles characteristic of particular individuals and means for comparison of the odor profile constituted by the multiplicity of signals from the sensor elements with an odor profile contained in said library. Standard pattern recognition techniques or a neural network (instant claims 147,149,152-153) may be adapted to retain characteristic features of the multiplicity of signals for incorporation into the library. The paragraph bridging pages 2-3 teaches that the conductive polymers may be selected from the following group: perimidine, polybenzene,

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polyphenylenesulphide, polyacetylene, **polyaniline**, polyphenylenediamine, **polypyrrole**, **polythiophene**, polyindole, polyimidazole, polythiazole, polybithiophene, polyphthalocyanine, polytryptophan and copolymers thereof. The following paragraph on page 3 teaches that a wide range of dopants may be employed including: nitrate, perchlorate, chloride, bromide, fluoride, sulphate, dodecyl and other alkyl sulphates, sulphonate, alkyl sulphonate, aryl sulphonate, fluoroborate, borate, phosphate, carbonate, iodide, ferricyanide; ferrocyanide, alkyl carboxylic acids (octanoic acid, acetic acid, etc), chromate, thiosulphate, sulphite, silicates and vanadate. Page 6 teaches that chemical polymerization may be carried out using suitable oxidizing agents such as sodium persulphate, sodium periodate, ferric nitrate, ferric perchlorate and the like added to a solution of the monomer deposited onto the upper surface of the cleared transducer. The polymeric material is formed as an insoluble layer and the upper surface of the interdigitated area covers the whole active surface of the transducer. Page 6 also teaches that electrochemical polymerization may be achieved by incorporating the interdigitated transducer into an electrochemical circuit as the anode or cathode dependent on the polymer species to be formed. Anodic deposition, the most common technique, is carried out by immersion of the transducer in a monomer solution with a platinum counter-electrode adjacent the surface and a reference electrode (silver/silver chloride or calomel) connected into the circuit via a salt bridge. The system may then be either maintained at constant potential or alternatively the potential may be cycled between two predetermined values to allow formation of the polymer film on the transducer surface. Examples on pages 11-13 illustrate the electrochemical polymerization process for poly-1,4-phenylenediamine, polyimidazole, polyquinoline, poly-N-phenyl-1,4-phenylenediamine, and a co-polymer of pyrrole and 1-methylpyrrole. The first full paragraph of page 13 teaches that polymers prepared using similar techniques include: **polypyrroles**, **polythiophenes**, polyindoles, polyphthalocyanines, **polyanilines**, polycarbazoles, polythionine, polyaminonaphthalenes, polyaminoanthracenes, polyphenylenediamines, polyaminiophenols, polynaphthyl(ethylenediamine), polyimidazoles, polyquinolines, polytryptophan, polyheterocycles, polyaminoheterocycles and substituted derivatives of the above compounds. The same paragraph also teaches that **copolymers and blends of the above compounds may be employed**. The listed polymers may be treated with various ionic dopant molecules, as outlined above, incorporated into the conducting films during and post polymerization. The last full

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paragraph of page 13 teaches that the array includes between 3 to several hundred sensors. Multiple arrays may incorporate 16 and 32 sensors and may be arranged to operate from either a constant current or constant voltage power supply. The sensor array may be disposed in the housing adapted to allow flow of a gaseous sample over each of the sensor elements. A gaseous sample may be simply injected into the space above the array. Alternatively a piston, bellows or other pump arrangement may be employed. Figure 1 and its description on pages 14-15 present the response of a 16 sensor array to two samples of odor from a subject collected in a syringe and blown across the array. The sensor elements that make up the array include the following polymers and dopants: 1) poly-n-ethylaniline with SO_4 counter ion; 2-3) poly-aniline with SO_4 counter ion; 4-5) poly-tryptophan with SO_4 counter ion; 6) poly-2-methoxy-5- nitroaniline with SO_4 counter ion; 7) thiophene/thiophene-3- carboxylic acid copolymer with tetrabutyl-ammonium perchlorate counter ion; 8) poly-aniline with ethanol and with SO_4 counter ion; 9) poly-pyrrole with octanoic acid ethyl ester dopant; 10) poly-pyrrole with an upper layer of poly-tryptophan with octanoic acid ethyl ester dopant and with ClO_4 counter ion; 11-12) poly-1,4-phenylenediamine with Cl counter ion; 13) poly-pyrrole with Cl counter ion; 14) poly-pyrrole with tetrabutyl-ammonium perchlorate counter ion; 15) pyrrole/1-methyl pyrrole copolymer with NO_3 counter ion; and 16) poly-pyrrole with octanoic acid ethyl ester dopant. Figures 3-4 show alternative configurations of the interdigitated electrodes. Pages 3-4 describe a second array of sensors including a different set of polymers that is intended for food analysis and quality control identification of bacterial infection, prediction of oestrus in livestock and environmental monitoring (instant claim 148). Page 16 describes a system for measuring the response of a 16 sensor array to compounds using a setup to sample the headspace above a liquid sample. This system uses a personal computer and dedicated software to acquire and process the resistance data. Gibson does elaborate on what constitutes a blend of the polymer compounds listed on page 13 and how the blend is different from the copolymers listed in the same sentence. Gibson also does not teach blends or mixtures of the listed conductive polymers with inorganic conductors (metal particles, metal oxides, etc.), organic conductors (carbon black, charge transfer complexes, etc.) and mixed inorganic/organic conductors claimed in which the two conductive materials are mixed together to form as a single sensing material having the compositionally different conductive material within the conductive organic material.

In the paper Barisci gives a review of conducting polymer sensors. The review examines recent advances in the application of electrically conducting polymers in sensing devices. Figures 1-2 and 4, reproduced below, show some representative conducting polymer and setups for different measurement methods found in the references applied against the claims. In 2(b) the working electrode is separated from the other two electrodes by the polymer layer so that in all instances the potential, current or resistance being measured is measured through the conducting polymer layer. The second paragraph of the article on page 307 teaches that the discovery of conductive electroactive polymers shown in figure 1 heralded a new era in electrochemical research because the materials are inherently conducting, an unusual property for a polymer. In the course of numerous studies it has become obvious that the electrical properties of these new materials are very dependent on their chemical composition and on the chemical environment to which they are exposed. This susceptibility to the chemical environment provides the basis for the use of these materials in new sensing technologies.

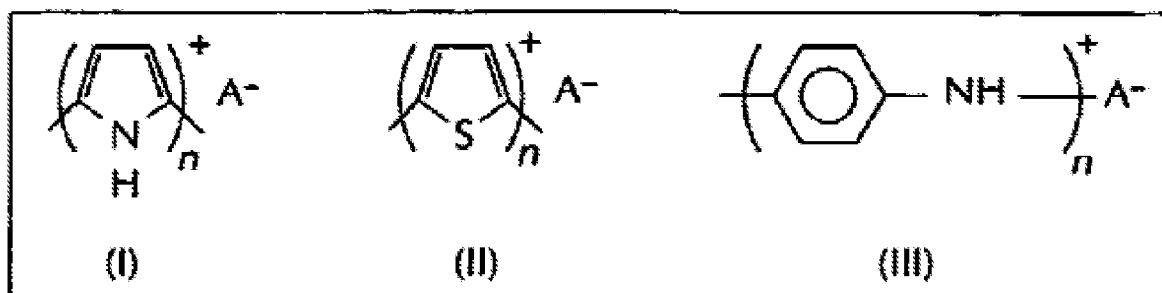


Fig. 1 Idealized structures of some common conducting electroactive polymers: polypyrroles (I), polythiophenes (II) and polyanilines (III) (A^- , counterion).

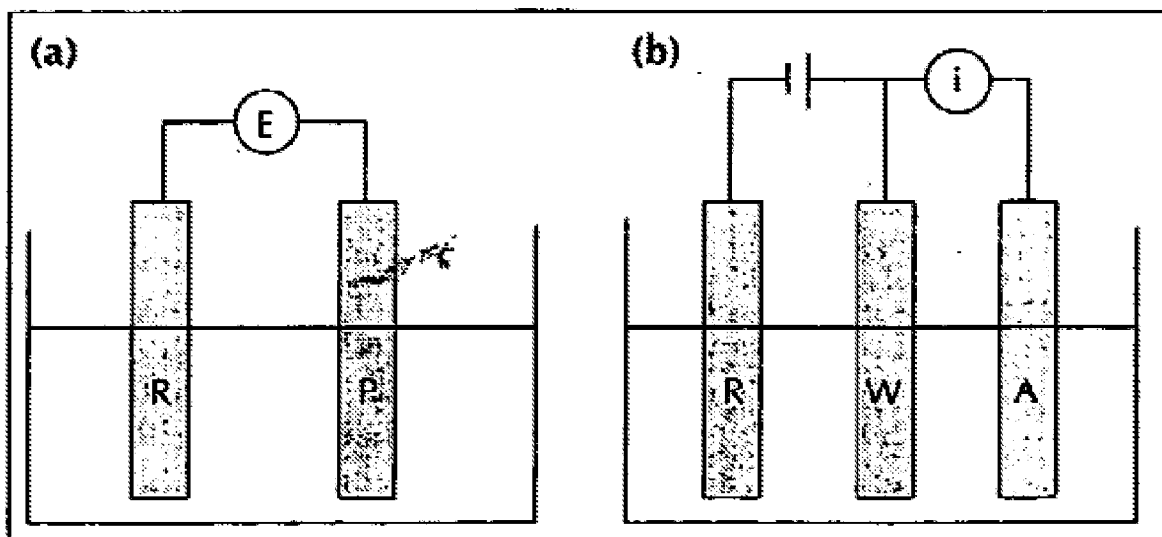


Fig. 2 (a) Setup for potentiometric measurement techniques: E, potential-measuring device; R, reference electrode; and P, polymer electrode. (b) Setup for current-measuring techniques: i, current-measuring device; A, auxiliary electrode; W, working electrode; and R, reference electrode.

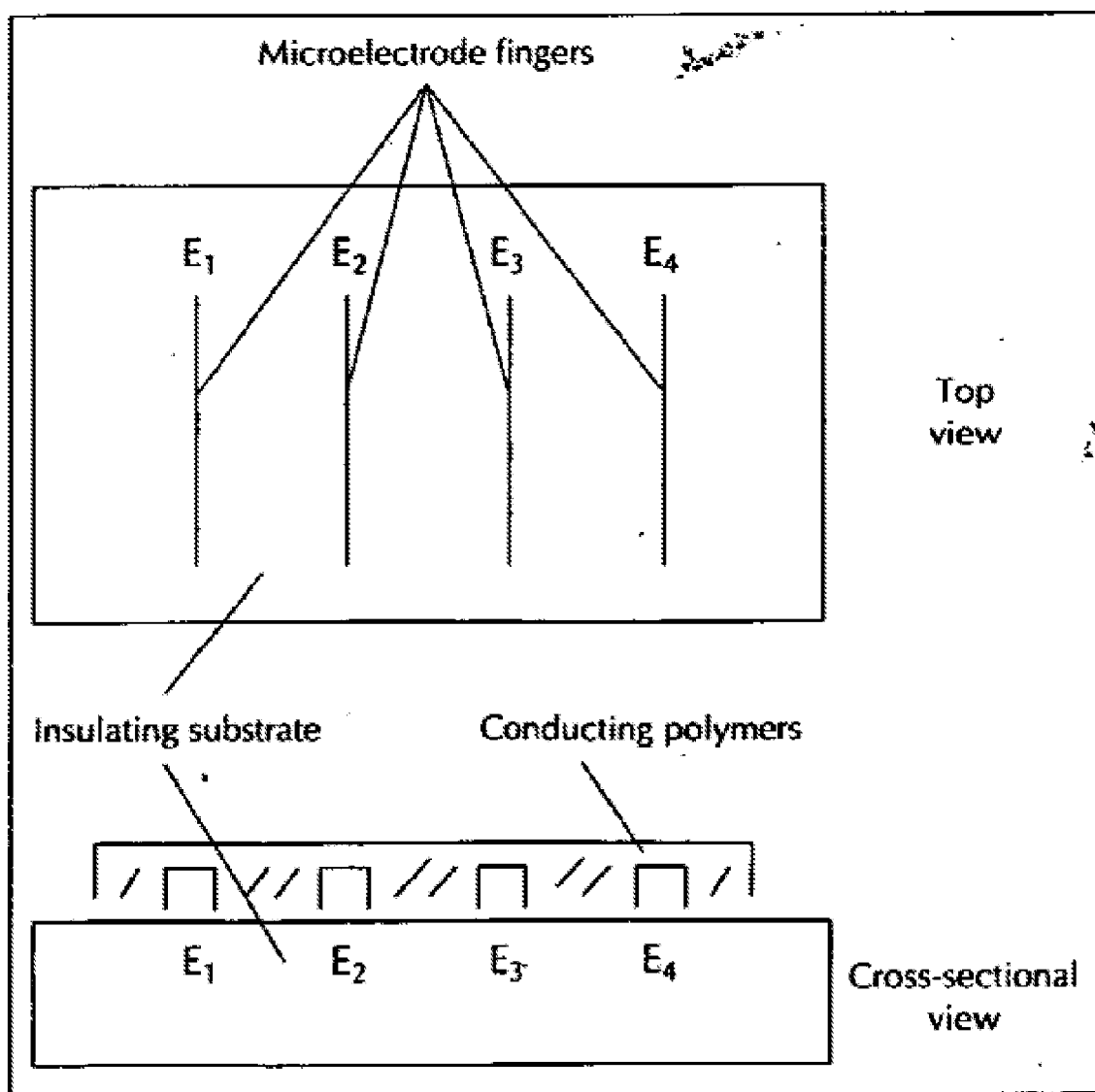


Fig. 4 Microelectrode array for resistance measurements. Current is passed between E_1 and E_4 , and the voltage drop between E_2 and E_3 is measured. This voltage is used to calculate the resistance.

Methods of signal generation, mainly electrical and electrochemical, are discussed, as are strategies for introducing into the polymer structure appropriate analyte recognition characteristics. The use of conducting polymers in gas sensors and in solution sensors for detection of chemical and biochemical species was reviewed with some conclusions. Relative to the methods of signal generation, page 307 teaches that the polymers can produce signal through

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potentiometric, current-measuring and conductometric/resistometric methods (see figures 2 and 4 above). The current-measuring methods (pages 307-308) are taught as including 3 or 4 ways that an analyte can interact with the conductive polymer (e.g. polypyrroles, polythiophenes and polyanilines) to modify the current flow as a function of the applied potential. Particularly relevant to the instant invention is the fact that the current measuring section on page 307 points to the conductometric/resistometric section (page 308) for one way that the current flow can be modified through interaction of an analyte and the conducting polymer. Further it is clear from the discussion of both sections that the current flow can be affected by the interaction of the analyte with the polymer or its counter ion (see the second full paragraph of the right column of page 308 and in particular the last sentence of the paragraph). Thus there is a connection between the different signal generation methods and the interaction of the analyte with the polymer that would have been recognized by one of skill in the art. In other words one of ordinary skill in the art would have recognized that changes affecting the current flow would have been expected to provide a measurable signal in both the current measuring and conductometric/resistometric methods. In the solution sensor section, amperometric detection is discussed. Relevant to the instant claims is the second full paragraph of that section on page 308. This paragraph teaches that amperometric detection is based on the changes in current flow caused by oxidation/reduction of the polymer. This paragraph also teaches that the selectivity to a particular anion or anions is influenced by counter anion incorporated into the polymer. The response observed is due to the inclusion/expulsion of cations present in solution as the polymer is reduced or oxidized. The first full paragraph of page 309 discusses the use of overoxidized polypyrrole, known to be less conductive (more resistive), as analytical sensor with sufficient signal to function as a sensor. This section also points to changes in a current measuring setup (amperometric) causing changes that would have been recognized as being measurable by the conductometric/resistometric methods. In the gas sensor section of the paper both electronic interactions with the polymer and swelling of the polymer by the analyte are discussed as the basis for the measurable changes in the current flow in the polymers. In the second full paragraph of the gas sensor section on page 310, the gas sensing properties of polypyrrole are discussed with the sensitivity of the polymer to different gases (NO_2 and H_2S) being based on their oxidizing or reducing the polymer. **The signal results from the associated change in the**

resistance of the polymer. This clearly shows a connection between the oxidation/reduction (redox) state of the polymers and the resistance level of the polymer and a corresponding expectation that changes causing signals with for a measurement method of the current measuring type **also causing a measurable change in the resistance of the polymer!** Page 310 also discusses the use of different pattern recognition methods when arrays of the sensors are used (see right column). In the first paragraph of page 311, a discussion of composite materials in which the conducting polymer is combined with another material. These composite materials showed improved reproducibility when used as sensors, adequately compensating for any problems due to an expected lower sensitivity. The third and fourth paragraphs of the same page discuss the versatility of these conducting polymers and the fact that the molecular structure of these materials influences their electrical properties and enables their interaction with a wide variety of chemical species leading to useful applications in solution and vapor phase sensing.

In the paper Casella discusses copper dispersed into polyaniline films (represents the inorganic conductor/organic conducting polymer combination) as an amperometric sensor in alkaline solutions of amino acids and polyhydric compounds. As a chemically modified electrode composed of copper microparticles dispersed into as a polyaniline (PANI) film was studied as an amperometric sensor of scanty electroactive compounds possessing -OH and -NH₂ groups. Glassy carbon was used as an electrode material and modified firstly by a PANI film, then allowed to stand in contact with a solution of copper ions, and finally, the electroreduction was done at -0.3V. Pages 218-219 teach two forms of the electrode setup with the flow cell (page 219) being a particularly relevant structure since the liquid flows through the cell, contacting all three electrodes. Page 220 in the sentence which bridges the two columns teaches that about 12% of the deposited copper was dispersed (able to penetrate) in the polymer matrix. The electrochemical behavior of the resulting modified electrode in alkaline medium was examined by cyclic voltammetry and flow-injection amperometry. Using some representative compounds, the effect of copper loading and pH on the electrode response was studied. Constant-potential amperometric detection was applied in conjunction with anion-exchange chromatography (AEC) separations of amino acids and carbohydrates. At an applied potential of 0.55 V vs. Ag/AgCl, the detection limits (S/N = 3) for all analytes studied ranged 5-15 pmol, and the linear dynamic range was three-four orders of magnitude above the detection limits. The

resulting modified electrode was found to retain 95% of its initial response in flowing streams for 3 hours of operating time. From the title at least it is clear that the copper particles are dispersed **into** the polyaniline films.

In the paper Thackeray teaches chemically responsive microelectrochemical devices based on platinized poly(3-methylthiophene) (represents the inorganic conductor/organic conducting polymer combination) and shows variation in conductivity with variation in hydrogen, oxygen, or pH in aqueous solution. Microelectrochemical transistors can be prepared by connecting 2 closely spaced ($\sim 1.2\ \mu\text{m}$) Au microelectrodes ($0.1\ \mu\text{m}$ thick $\times 2.4\ \mu\text{m}$ wide $\times 50\ \mu\text{m}$ long) with anodically grown poly(3-methylthiophene). The amount of poly(3-methylthiophene) used involves about 10^{-7} - 10^{-6} mol of monomer/ cm^2 . Poly(3-methylthiophene) can be platinized by electrochemical reduction of PtCl_4^{2-} at the pair of coated electrodes. The change in conductivity of poly(3-methylthiophene) with change in redox potential is the basis for amplification of electrical or chemical signals; the conductivity varies by 5-6 orders of magnitude upon change in potential from +0.2 (insulating) to +0.7 (conducting) V vs. SCE in aqueous electrolyte. The Pt equilibrates poly(3-methylthiophene) with the $\text{O}_2/\text{H}_2\text{O}$ or $\text{H}_2\text{O}/\text{H}_2$ redox couples. [Poly(3-methylthiophene)/Pt]-based transistors are shown to be **viable room-temperature sensors** for O_2 and H_2 in aqueous solution. The O_2 reproducibly turns on the device, with 1 atmosphere of $\text{O}_2/0.1\ \text{M HClO}_4/\text{H}_2\text{O}$ showing 0.7-mA I_D at a $V_D = 0.2\ \text{V}$; H_2 reproducibly turns off the device, with 1 atmosphere of $\text{H}_2/0.1\ \text{M HClO}_4/\text{H}_2\text{O}$ showing less than 20-nA I_D at a $V_D = 0.2\ \text{V}$, where V_D (drain potential) is the applied potential between the 2 Au microelectrodes and I_D (drain current) is the current that passes between the 2 microelectrodes. The turn on with O_2 is complete within 2 minutes, and the turn off with H_2 is complete within 0.3 minutes. A platinized microelectrode of a dimension similar to the microelectrochemical transistor shows only 1.0-nA reduction current upon exposure to 1 atmosphere of O_2 ; the current amplification of the transistor is thus a factor greater than 10^5 . The transistor device can also reproducibly respond to pH changes in the pH range of 0-12, when there is a constant O_2 concentration; there is a reproducible change in I_D to alternate flow of a pH 5.5/pH 6.5 stream for over 10 h. The device responds to an injection of $10^{-6}\ \text{L}$ of 0.1 M HClO_4 into an effluent stream of 0.1 M NaClO_4 (flowing at 2 mL/min) within 4s. Study of the resistance properties of [poly(3-methylthiophene)/Pt] vs. potential reveals that Pt has little effect on the intrinsic conductivity of

poly(3-methylthiophene). Rather, the role of Pt is purely as a catalyst to allow equilibration of O₂ and H₂ with the polymer. The amount of Pt used is approximately 10⁻⁷ mol/cm², and microscopy shows Pt to be present as a particle of less than 0.1-μm size.

In the paper Yamato presents a new method for dispersing palladium microparticles in conducting polymer films (represents the inorganic conductor/organic conducting polymer combination) and its application to biosensors. Page 232 teaches the electrochemical measurements performed in a three electrode cell into which the glucose was injected. Composite films of polypyrrole/sulfated poly(β-hydroxyethers) (PPy/S-PHE) are electrically conducting and mechanically flexible. Palladium particles were dispersed in the films by thermally decomposing bis(dibenzylideneacetone)palladium(0) complex which had been absorbed by the films from a CHCl₃ solution. This method for loading metal particles was enabled by the high affinity of the composite films for organic compounds. TEM and energy-dispersive x-ray spectrometry (EDX) analyses revealed that fine palladium particles in the nanometer range are dispersed in the PPy/S-PHE conducting films. A glucose sensor based on the detection of hydrogen peroxide was prepared by immobilizing glucose oxidase (GOD) using glutaraldehyde on a Pd/PPy/S-PHE electrode. This biosensor responded to glucose even at 400 mV vs. Ag/AgCl, which is lower than the working potential of conventional glucose sensors prepared on a platinum electrode.

In the published application Naarmann teaches manufacture and use of electrically conductive polymers of five-membered heterocyclic compounds and anions of tetrathiafulvalene derivatives (represents the organic conductor/organic conducting polymer combination, see table 2, page 28 of the instant specification). The polymers are prepared by electrochemical oxidative polymerization of 5-membered heterocyclic compound(s) in the presence of conducting salts containing anions of tetrathiafulvalene derivatives. The last paragraph of page 3 of the translation teaches that the object of the invention was to disclose polymers from the class of 5-member ring heterocycles that, in addition to high electrical conductivity and a high mechanical level, also possess additional valuable properties. Pages 4-5 of the translation list several pyrroles and thiophenes and possible copolymerizable compounds for use on the invention. Pages 6-7 of the translation gives the structure of the tetrathiafulvalene compounds used. The first paragraph of page 10 of the translation teaches that the polymers contain tetrathiafulvalene

firmly incorporated in the system, are particularly stable to the effects of water and oxygen and are suited to be used in sensors or as battery electrodes. Derivatives of tetrathiafulvalene were synthesized in examples 1-2. A solution of 1 part pyrrole and 1 part NH_4 salt of 3,6-di- - sulfobenzyloxy-1,2,4,5-benzo-bis(11,11',12,12'-dibenzotetrathiafulvalene) in 100 parts MeCN was electropolymerized by using Pt electrodes in example 3. The obtained polymer film had an electrical conductivity of 80 S/cm and showed a superior stability in a 1-week storage in water compared to a ClO_4^- -containing polypyrrole film (page 14 of the translation).

In the paper Li teaches the preparation and characterization of polyaniline-palladium composite films (represents the inorganic conductor/organic conducting polymer combination). Electrosynthesized polyaniline (PANi) can be chemically functionalized by incorporation of palladium clusters. The functionalization of electrochemically, freshly prepared and dried PANi film occurs spontaneously during the relaxation process. This process is carried out in sulfuric acid containing palladium salt. The material properties of the new composite PANi-Pd film were investigated by applying electrochemical, UV-visible spectroscopic and surface microscopy techniques. The PANi-Pd composite materials behaved electrochemically different than PANi film alone or Pd film deposited electrochemically. This finding is **particularly important for developing layers for chemical gas sensors**, electrocatalysis or supercapacitors applications. Page 581 discusses the emeraldine (conducting) form of polyaniline.

In the published application Sakaguchi teaches electrodes for gas sensors (sulfur dioxide or carbon monoxide, page 2 of the translation). The electrodes consist of a composite of a resin compound, a conductive resin compound, and optionally an organic metal complex compound. Preferably, a conductive resin compound is manufactured by chemical oxidation polymerization or electrolytic polymerization. The gas sensors are useful for detection of gas components in exhaust gases and combustion waste gases, and have long life. From the attached Chemical Abstracts abstract it is clear that at least polypyrrole is disclosed as a conductive resin polyvinyl chloride is disclosed (an insulator, see claim 101) and cobalt phthalocyanine are disclosed (represents the organic conductor/organic conducting polymer combination). The JPO abstract teaches iron or platinum complexes with phthalocyanine and naphthalocyanine also being used. Page 5 of the translation lists several possible resins in the second full paragraph and several metal organic complexes in the last paragraph. The first paragraph of page 7 of the translation

gives a more complete listing of the gases to be sensed. The paragraph bridging pages 9-10 of the translation gives a more complete listing of the possible electropolymerizable compounds. The examples show the different ways of making the electrodes and their use in sensing gases. The last page of the translation lists the various benefits of the electrode structure taught including stability (last a long time without catalyst loss), good selectivity and detection sensitivity and reduced weight in combination with excellent moldability.

In the paper Wampler discusses the chemical synthesis and characterization of composites of polypyrrole and carbon black. A new class of molecular composites of carbon black and an electronically conducting polypyrrole has been synthesized by chemically polymerizing pyrrole in an aqueous dispersion of carbon black. The carbon black content of these composites can be varied from ~5% to ~85% (by weight). The surface areas and densities of these composites were compared to corresponding mixtures of carbon black and polypyrrole. The influence of carbon black on the efficiency of polymerization of pyrrole is described. The effect of carbon black content on the electronic conductivity of the composite has been mapped, and compared with the corresponding behavior of a mixture of carbon black and poly(vinyl chloride). The influence of the parent black characteristics (porosity, void vol., surface area) on the electronic conductivity of the resultant composite has been probed by comparing the behavior of composites derived from six commercial and experimental blacks. The temperature dependence of the composites has been studied as a function of the carbon black content. The application of these new materials is examined. The first page of the paper teaches that the potential applications include sensors, electrocatalysis, super capacitors and fuel cells. In the sentence bridging pages 1811-1812 Wampler teaches that other similar composites of conducting polymers with polymers, metals, or metal oxides has extended the scope of their use. The paper clearly shows that the composite is superior to either component of the composite when applied to the electrocatalysis of chromium(VI) to chromium(III).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teachings of Casella, Thackeray, Yamato, Naarmann, Li, Sakaguchi or Wampler relative to the incorporation of conductors such as carbon black, anions of tetrathiafulvalene derivatives, metal particles or metal oxide into the conductive organic polymers used in the sensing arrays of Gibson because of their sensitivity to known analyte gases

or enhanced sensing and/or stability properties as taught by each of Casella, Thackeray, Yamato, Naarmann, Li, Sakaguchi or Wampler compared to sensors made with only the conductive polymers taught by Gibson and the recognized ability and expectation of the Gibson conductive polymers to be affected by interactions in a number of sensing formats in a manner that changes the electronic structure and as a result the resistivity of the polymer as shown by Barisci.

Claims 114, 116, 136, 138 and 158 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gibson in view of Barisci and Casella, Thackeray, Yamato, Naarmann, Li, Sakaguchi or Wampler as applied to claims 108, 113, 115, 128, 135, 137 or 152 above, and further in view of Breheret, Mifsud (both US 5,801,297 and WO 95/08113), Moy or Persaud (WO 86/01599). Gibson does not teach a temperature control apparatus in thermal communication with at least one sensor or a sensing array having sensors that are not organic polymer based.

In the paper Breheret presents online differentiation of mushrooms aromas by combined headspace/multi-odor gas sensors devices. A specially designed measurement cell for direct headspace analysis, online connected to (i) a gas chromatograph equipped with an headspace injector and a sniffing-port, (ii) multisensors devices: five semiconductor gas sensors and twenty conducting polymer gas sensors, was used to discriminate nine mushrooms' aromas. The raw data of gas sensors were statistically processed, and provided pictorial presentation under sample distribution in a plan, allowing comparison the different mushrooms' aromas, with the GC/sniffing analysis. Semiconductor gas sensors succeeded in classifying four groups based on overall odor. Semiconductor gas sensors seem to be more appropriate for the mushrooms aromas discrimination than conducting polymer gas sensors. These preliminary results confirm the interest of such technologies for chemotaxonomy differentiation of wild mushrooms. Page 104 in the discussion of semiconductor gas sensors teaches that a control unit providing a constant potential to the sensor circuit voltage and a variable potential to the heater circuit is used (a temperature controller is used).

The US Patent is the result of a national stage application resulting from the published patent application and constitutes an English language equivalent/translation of the Mifsud application. Thus examiner has used the US Patent as a translation of the published application

in addition to a reference. In the patent and published application Mifsud teaches methods and devices for the detection of odorous substances and applications. A device for carrying out a method of odor detection including, in particular, a plurality of chambers, each having a plurality of semi-conductor gas sensors, conductive polymer gas sensors, surface acoustic wave gas sensors, as detection means, a variable flow gas pump for forming a gas flow in said chambers, measurement electronic device for operating the detection means, a data processing unit for recording in a file the olfactory prints obtained using the detection means, and for comparing the detected impressions with those in the file so that odors may be identified and recognized. Applications, especially to drugs, explosives, body odors and food seals are taught. Column 1 of the patent discusses the various types of sensors available and notes that semiconductive gas sensors must operate at a high temperature, around 350 degrees C. Column 6, line 62 to column 7, line 57 teach at least one temperature sensor and humidity sensor, are placed in at least one of the enclosures to measure the temperature and the humidity of the gas flow. The temperature and humidity level parameters influence the measurements of the piezo-electrical and/or electrical properties of the gas sensors. It is therefore necessary to know the values of these parameters to perform comparisons of the odorous substances. The set of gas sensors, temperature sensor and humidity sensor are connected to measurement electronics enabling the steps of testing and measuring the electrical and/or piezo-electrical properties of the gas sensors with or without odorous substances and measuring the temperature and humidity of the gas flow. The data is furnished by the choice of the sensitive parts equipping the sensors, notably the choice of polymer for the conductive-polymer sensors and the surface-acoustic-wave sensors based on the needs of the user of the apparatus. For the semiconductive sensors, the data is furnished by the choice of the type of metallic oxide as well as the choice of their respective operating temperatures, according to the needs of the user. The temperature can be regulated independently for each semiconductive sensor by the measurement electronics, during the stage of testing the electrical properties, in order to determine an optimal range of usage of the sensors.

In the paper Moy discusses transient signal modeling for fast odor classification. The Fox 2000 is an electronic nose system using an array of 6, 12, or 18 gas sensors. The analysis of sensor signals coming from a combination of metal oxide sensors and conducting polymer elements indicates the ability of predicting in only a few seconds the nature of a sample (hams,

sausages, cereals...) from its olfactory fingerprint. The simulation of the signals is performed via exponential functions and applied to various foodstuffs. Online and real time Artificial Neural Network (ANN) have also been investigated for fast odor classification and recognition. Six different brands of sausages (pure pork, beef/pork sausages) have been analyzed using a 6-element array. Six samples of each type of sausage were measured 12 times and discriminant analysis was performed over the set of 72 samples using the raw data of acquisition. 94% of the samples were correctly classified and cross validation (testing unknown samples) gave an overall success rate of 83% correctly classified samples. These results indicate the possibility to use electronic noses and pattern recognition methods for fast odor classifications.

In the published application Persaud teaches gas sensors. A sensor for gases, vapors, or odors has an organic polymeric semiconductor element which changes its electrical resistance in the presence of certain gases. The polymer is formed by electrolytic deposition on the substrate from a solution of its monomer, the solution comprising a solvent medium in which the monomer is sparingly soluble, a protic solvent, and an ionic base. A number of different gas detectors can be used to obtain from each a characteristic response to the presence of a gas, and the combination of responses can be used to distinguish between gases. The different detectors may be all based upon organic polymers, or one or more detectors may use other principles such as flame ionization or gas chromatography. The sensor is useful in monitoring industrial environments, gas liquid chromatography, quality control in food and drinks production, and food production. Page 14, line 2-9 teach that the different types of sensors can allow the device to detect between odors that it might not otherwise be able to discriminate. Page 16, lines 15-21 teach that an alternative form of the sensor is as a polymer coated field effect transistor.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate other types of sensors such as the metal oxide and/or surface acoustic wave devices taught by Breheret, Mifsud, Moy or Persaud into the Gibson device because of the ability to use them in combination with conducting polymer sensors to discriminate odors that would not easily be discriminated by a single type of sensor as taught by Breheret, Mifsud, Moy or Persaud or in the review of Barisci. It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate a temperature controller into the Gibson

device because of the need for sensors such as the semiconductor sensors of Breheret and Mifsud to operate at an elevated temperature for sensitivity as taught by Breheret and Mifsud.

(10) Response to Argument

The response below incorporates portions of the response of the examiner's answer with additional comments directed to Appellant's arguments in the Reply Brief

Relative to the scope being claimed, most of the arguments of Appellant are directed to claim 98. In this respect examiner also points to claims 104-105 being possibly somewhat narrower in the scope of the alternating regions of the two conductive materials, but broader in the scope of the material group that can make up the compositionally different conductive material. Thus, where the references are applicable to this broader scope, examiner will reference these claims. It is additionally noted that claim 127 is the broadest scope of those claims that require a plurality of sensors.

Relative to the statement in the last sentence of page 5 of the Reply Brief, examiner points out that in the Barisci reference, the second and third paragraphs of the paper on page 307 point to the paper looking at the electrochemical properties of the conducting polymers and their use in sensors. These two paragraphs have been reproduced below.

“The discovery of conductive electroactive polymers, such as polypyrroles (I) polythiophenes (II) and polyanilines (III) (Fig. 1) heralded a new era in electrochemical research. The initial euphoria arose from the fact that these materials are inherently conducting, an unusual property for a polymer. Lightweight polymer wires were intended to replace metallic wires; however, this proved difficult to achieve. It was also recognized that these polymers were electroactive and so capable of acting as energy-storage devices like batteries, and some success has been realized in this area. However, in the course of numerous studies it has become obvious that the electrical properties of these new materials are very dependent on their chemical composition and on the chemical environment to which they are exposed. This susceptibility to the chemical environment may thwart the development of polymeric conducting wires and energy-storage devices; however, it provides the basis for the use of these materials in new sensing technologies. “

“The above properties combined with the chemical versatility of the materials (the chemical properties are easily modified by attaching functional groups or incorporating different counterions, A-, in structures I-III) have provided a seemingly limitless supply of new electrode materials. These electrode materials are directly applicable in the development of new sensors for solution- or gas-phase analysis. “

It is clear that the electrical properties of these materials are sensitive to both the material composition and the environment in which they are placed. Thus Barisci shows that there is an expectation that the electrical properties of the conducting polymers of Gibson (the primary reference) are different from those of the secondary references (Casella, Thackeray, Yamato, Naarmann, Li, Sakaguchi and Wampler) having conducting polymer compositions within the scope of the instant claims. The sensitivity to the environment can be measured in a number of ways. While the measuring setup is different for each technique, the conducting polymer is common to each of these measurement techniques. Additionally whether one is measuring the resistance of the conducting polymer or the current passing through the conducting polymer, a potential is placed between the electrodes and electricity (current) flows through the polymer. It is the changes in the electrical properties of the conductive polymer as it interacts with the environment that are being measured. Pages 307 and 308 outline the various methods to measure the changes in the electrical properties. In this discussion of Barisci, it is clear that the conductivity of the material can affect the current measuring technique (see the parentheses in the first paragraph under the "Current measuring techniques" heading of page 307). The discussion on page 308 clearly shows that the current measuring techniques and the conductimetric/resistometric techniques are both sensitive to interactions of the environment and the counter ion. Thus while there are differences in the measurement techniques, there are clear indications that the electrical properties measured by each technique are sensitive to the same/similar type of interactions with the environment. Thus, one of ordinary skill in the art would have recognized commonality between the properties of the conductive polymers and the ability to measure a change in the properties of the conductive polymers by the two measurement techniques. While the setup used to measure the properties may be different for the two measuring methods that fact that the interaction with the environment causes change in the electrical properties does not change. It is this aspect that Barisci shows is common between the two sensor types even though the measuring apparatus is different. This is clearly relevant to the rejections since it is replacement of the conducting polymer compositions of Gibson with those of the secondary references above that examiner is urging to be obvious in view of the teaching of the applied art.

With respect to the figures submitted with the Appeal Brief examiner maintains that there are problems with the representations shown in figures 1-2. First figure 1 appears to show the regions as regular stacked separate alternating regions rather than the random regions that exist unless Appellant has used some technique to produce regular regions. The regions of figure 1 appear to have been produced by a method as found in the cited Iyoda reference. Appellant points to page 44, lines 1-13 as providing support, however an expanded look at that paragraph, page 43, line 14 to page 44, line 13, clearly shows that the elements referred to in the section on page 44 are sensor elements not the alternating regions of the conductive organic material and the compositionally different conductive material of the claims. Furthermore, page 38 lines 5-7 teach that the chemiresistors can be fabricated by techniques that would not produce regular layered regions as shown in figure 1. These techniques include solution casting, suspension casting and mechanical mixing. Also see the “interpenetrating language of claims 104-105. Second, the Barisci figure 2 is a more general depiction of the structure used to make the amperometric measurements. This structure is consistent with the structure described in the secondary references using amperometric detection. Since Appellant has not provided a cite for the basis of their structure of figure 2 or shown how the descriptions in the applied references are equivalent to that structure, the Barisci reference structure is the appropriate one to consider with respect to the instantly applied references. Relative to the Barisci structure being the structure of the references, examiner points at least to the Casella and Yamato references to show the equivalence of the Barisci structure with the applied references using amperometric detection. On page 319 under the electrode preparation section Casella teaches the preparation of the polymer electrode by electrodepositing a film of the polyaniline on the glassy carbon (GC) electrode. This description does not teach the formation of a combination electrode in which a membrane acts as the interface between the sample and an electrolyte containing cell. The flow through cell described has three separate electrodes that contact the sample flowing therethrough. On page 232 of the Yamato reference a similar three electrode configuration is described in the measurements section. More importantly the glucose being measured was injected into the electrochemical cell. Thus in this reference also the analyte contacts all three electrodes in the cell. Thus Appellant’s statement in the second full paragraph of page 5 of the Appeal Brief filed November 13, 2006 and in the first full paragraph on page 8 of the instant Reply Brief that the

analyte does not come into direct contact with the sensor, is not consistent with the structure or descriptions of these references. However the Barisci structure is fully consistent with these references. It is noted that Appellant does not cite any basis for the statements made regarding the desirability of the sensing materials in an amperometric-electrometric sensor to not change conductivity or remain “invisible” during the analysis in the first full paragraph of page 6 of the Brief. Nor is there any basis given for these statements on pages 8 of the Brief. Therefore these statements are not supported by any art or probative evidence and constitute attorney arguments (see *In re Schulze*, 346 F.2d 600, 602, 145 USPQ 716, 718 (CCPA 1965) and *In re Geisler*, 116 F.3d 1465, 43 USPQ2d 1362 (Fed. Cir. 1997)). In this respect examiner also points to scheme 1 of the Thackeray reference which clearly shows the change in conductivity as a function of the redox state of the sensing material. Thus the references themselves point to the redox changes affecting the conductivity of the sensing material in contradiction to the above attorney argument.

In the last full paragraph of page 8 of the instant Reply Brief, Appellant refers to the Sestak reference, which is of record in the instant application. What Appellant did not point out about this reference is maybe as important as what Appellant did say. The reference was applied against the claims and was removed as a reference by Appellant through submission of a declaration under 37 CFR 1.131 (see the declaration dated 3-4-03). In the first full paragraph on page 118 of the reference, the instantly applied Barisci reference was cited (see reference 2). In addition to teaching some drawbacks related to conducting polymers in sensing applications, this reference does clearly show what one of skill in the art did at around the time of the instant invention in view of the teachings of the Barisci reference and references that teach the incorporation of metal particles into conducting polymers in catalytic electrode applications (see reference citations 5-8 on pages 128-129 of the reference).

With respect to the argument on page 7 of the Appeal Brief and page 10 of the Reply Brief that the Casella, Thackeray, Yamato, Naarmann, Li, Sakaguchi and Wampler references do not teach materials that are sensitive to known analyte gases, examiner replies that the instant claims do not require the sensitive materials to be sensitive to any particular gas (see claims 98 or 127 for example). Thus there is no requirement for the sensitive layer to be sensitive to any particular analyte gas. Relative to the comments about the Naarmann and Sakaguchi references

on pages 9-10 of the Reply Brief based on the translations of these references, it is not clear if Appellant is trying to argue that the sensors of the instant invention do not experience a change in the oxidation state when interacting with an analyte of the scope claimed or if such a change does not cause a change in resistance of the conducting polymers. As noted above and further explained below, this is not consistent with the applied references. Furthermore as taught by Barisci and shown by Thackeray, one of ordinary skill in the art would have recognized that a change in redox state would generally be accompanied by a change in the conductivity or resistivity. Thus these references are particularly pertinent to the question of how do the properties of these composite materials vary when compared to the single materials. In this respect there is a clear indication in Barisci that the redox changes of the amperometric sensor materials would have been expected to result in a corresponding change in the conductivity of the materials. Since this is that basis of the conductometric/ resistometric detection methods also discussed by Barisci, one would have expected a corresponding ability to detect the changes by this method also. This is part of the basis of the combinations and motivation used to make the instant combinations. Contrary to Appellant assertion (pages 7-8 of the Appeal Brief and pages 10-11 of the Reply Brief), this does meet the requirements for a *prima facie* case of obviousness in that there is both suggestion and motivation in the references as explained below to make the proposed combinations. Also contrary to Appellant's assertion that the combination requires one to discard the fundamental principles of the amperometric-electrochemical sensors, the Barisci reference shows that changes in the sensing polymer properties due to an interaction with an analyte are detectable by the measurement methods of both the amperometric and conductometric types of detectors: at least changes in redox of the polymer are also associated with changes in the conductivity of the polymer. Additionally the Barisci reference discusses polypyrrole conducting polymers in both the solution sensor (amperometric) and gas sensor (conductimetric/resistometric) applications. Thus, the sample or similar types of materials are shown to be sensitive to analytes in both applications. Since there is motivation within the applied references to make the combination, examiner does not need to rely on the expanded obviousness reasons discussed in and allowed by the U. S. Supreme Court in the KSR International Co. v. Teleflex Inc. decision. Examiner notes that while one must consider the teachings of the references to determine obviousness (*Graham v. John Deere Co.*, 383 U.S. 1,

148 USPQ 459 (1966)), the test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference; nor is it that the claimed invention must be expressly suggested in any one or all of the references. Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981).

Relative to the alleged teaching away by the Breheret and Mifsud references (see page 12, last full paragraph, page 13, first full paragraph and page 23, last full paragraph of the Reply Brief), examiner responds that Appellant has not limited the type of gases being sensed, the Gibson reference is clearly directed to sensing gases and although the Breheret and Mifsud references might teach that a particular gas or gas mixture can be better sensed by a different kind of sensor, it does not teach that the materials do not have sensitivity to other gases or the gas being sensed. The instant claims only require a general sensitivity to any gaseous analyte rather than sensitivity to a specific analyte. The instant claims also do not require any level of sensitivity to the analyte. Thus these comments/arguments are clearly not commensurate in scope with the claims. Additionally, if the references taught away from using conductive polymer sensors, they would not include such sensors in their devices. Since the Breheret and Mifsud references do include conductive polymer sensors in the array of sensors, the references do not teach away from using the sensors in an array of different types of sensors, contrary to appellant's assertion. It is also noted that these references are only applied relative to the claims that require additional structure (temperature control or sensors that go beyond the structure required by claims 98 and 104-105). Additionally, the instant rejections do not change the operational principle of the Gibson reference, they modify the sensing material to incorporate conductive particles or other conductive materials within the claimed scope of the compositionally different conductive materials required by the claims. In response to Appellant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning (page 13, last paragraph of the Reply Brief), it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the

applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Relative to the discussion of figure 1 from the Barisci reference above (page 14 second full paragraph of the Reply Brief) examiner notes that the analyte interacts with the conducting polymer, and the polymer forms at least a part of the sensing region. This interaction causes a change in the electrical properties of the conducting polymer. Additionally it is noted that although claims 98, 104-105 108 126 and 128 are not claiming the analyte gas as an element of the device, the Gibson reference clearly works based on the principles of applicants claimed conducting polymer sensors. Thus replacement of the materials of Gibson in the Gibson structure with the materials of Casella, Thackeray, Yamato, Naarmann, Li, Sakaguchi or Wampler as the combination of references suggests would meet this requirement.

Relative to the comments about figure 2(a) of Barisci (page 14, last full paragraph of the Reply Brief), examiner notes that it does not appear to relate to any of the Gibson, Casella, Thackeray, Yamato, Naarmann, Li, Sakaguchi and Wampler reference sensors. Relative to the comments about figure 2(b) of the Barisci reference (page 14 last paragraph of the Reply Brief), examiner notes that the Barisci reference clearly teaches that the analyte interacts with the polymer in at least one of three or four ways: participating in an electron transfer reaction, modifying the redox characteristics of the polymer, changing the capacitance of the material, and a reference to the conductimetric/resistometric techniques (page 307 of Barisci). If the polymer does not interact with the analyte, there is no reason for its presence since a bare metal electrode should work just as well to measure the conductivity of the solution or the current flow through the solution and any change due to the analyte. It is because there is an interaction between the polymer and the analyte that the polymer is used.

Relative to the statement first full paragraph of page 15 of the Reply Brief, examiner feels that applicant has misinterpreted examiner's position. Most if not all of the Casella, Thackeray, Yamato, Naarmann, Li, Sakaguchi and Wampler references contain statements that the conducting polymers they teach that are within the scope of the instantly claimed conducting polymers have advantages of one form or another compared to the pure conducting polymer as taught as the sensing material of the Gibson reference. The Barisci reference provides a connection between the conductive polymers used in the Gibson reference and the Casella,

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Thackeray, Yamato, Naarmann, Li, Sakaguchi and Wampler references and shows that one of ordinary skill in the art would have understood how the analyte interacts with the polymer in the respective sensing techniques. From this there would have been an expectation that the interactions of analyte with the polymer used leading to changes in the electrical properties of the polymer measurable by one sensing technique (amperometric) would have pointed to interactions with an analyte leading to changes in the electrical properties of the polymer measurable by a second sensing technique (conductimetric/resistometric). Relative to the statement in the Casella reference conclusion, examiner notes that the left hand column of page 218 of the reference discusses the prior use of polyaniline and teaches that it is chemically stable. The last paragraph teaches that although these films have been extensively used and characterized in acidic and neutral media there was not a study in an alkaline media. Thus its properties in an alkaline media were unknown at that time. In figure 1 and its associated description in the paragraph bridging pages 219-220, curve 1c shows the behavior of a polyaniline (PANI) film in alkaline media and teaches that this is due to the polymer being in the neutralized free-base form. This appears to be what is meant by the polymer is inert as found in the conclusion of the paper. The paragraph bridging the columns of page 221 is clear that the electrode interacts (reacts with hydroxide) with the analyte. The paper also is silent on if this interaction changes the redox properties of the material. Thus the paper does not teach away from the combination. In spite of this characteristic of the polymer alone, adding the metal particles produces a measurable change in the current. It is also clear from the discussion that the polymer is electroactive (conductive) in acidic environments. The Casella reference shows that the incorporation of the copper particles allows the current to be measured, provides some conductivity, even when the polymer is not very conductive. This reference is also clear that the stability of the polymer is enhanced by the addition of the metal particles (see pages 218 and 224). Examiner also notes that the method by which the Gibson reference functions has not changed. Even if the conducting polymer materials of Casella, Thackeray, Yamato, Naarmann, Li, Sakaguchi and Wampler replace the conductive polymers of Gibson, the Gibson device will function as it did previously. The devices of Casella, Thackeray, Yamato, Naarmann, Li, Sakaguchi and Wampler are not being modified to meet the instant claims. Thus examiner is not changing the way the sensors of Gibson operate contrary to the argument of Appellant on page

16 of the Reply Brief. If examiner had not considered the difference between the two types of sensors, then the Barisci reference would not have been used.

Relative to the argument on page 17 of the Reply Brief, examiner notes that page 307 of Barisci clearly teaches 3 to 4 ways in which the amperometric sensor “interacts with” the analyte of which one is that it participates in the electron transfer reaction. However an analyte can also “interact with” the polymer by changing the redox state of the polymer (potentially making it more or less conductive) and by a mechanism that is referenced by Barisci to the conductimetric/resistometric measuring technique. Thus there is a clear reference in Barisci to the analyte “interacting with” the conducting polymer to change electrical properties that would have been recognized as measurable by the conductimetric/resistometric technique. Examiner is not saying that Barisci shows that the current measuring techniques measure resistance, that is Appellant’s misinterpretation of what examiner has said. As noted above examiner’s position is that Barisci teaches or shows that the “interaction” of the analyte with conducting polymers in the amperometric (current) measuring technique results in changes in the electrical properties (conductivity/resistivity) of the conducting polymer that would have been recognized or expected by one of ordinary skill in the art to be measurable by the conductimetric/resistometric technique. Thus the teachings in the Casella, Thackeray, Yamato, Naarmann, Li, Sakaguchi and Wampler references relative to the conducting polymers and their advantages over the conducting polymers of Gibson would have motivated one of ordinary skill in the art to replace the polymers of Gibson with the polymers of Casella, Thackeray, Yamato, Naarmann, Li, Sakaguchi or Wampler in the Gibson sensors.

Relative to the “Sensitivity to Analytes” section on pages 19-20 of the Reply Brief, examiner notes that one of the major conducting polymers discussed by Barisci is the polypyrrole (PPy) conducting polymer. This is found in both the solution chemical sensors and biosensors sections as well as the gas sensors section. Thus polypyrrole is known to be used in both types of sensors and to interact with analytes to produce measurable changes in the current and conductimetric/resistometric measuring techniques discussed by Barisci. This is another evidence that the conducting polymers would have been expected by one of ordinary skill in the art to show measurable responses to analytes using both measuring techniques.

Relative to the Yamato reference comments on page 22 of the Reply Brief, examiner notes that the claims do not exclude components attached to the conducting polymer surface. Additionally since the analyte is not positively recited as an element of the device the process by which the analyte interacts with the conducting polymer to produce a change in the conductive polymer that is measurable by a conductimetric/resistometric technique also does not limit the structure of the device. Moreover there is no requirement that the conducting polymer is sensitive to a specific analyte.

Relative to the Appeal Brief attacking the Gibson and/or the Barisci references individually (page 23, first full paragraph of the Reply Brief), examiner notes that it is the combined teachings of the references that are being used to reject the claims rather than the teachings of the individual references. Furthermore, the Gibson as the primary reference or the reference whose teachings are being modified has already been acknowledged by examiner to be deficient in one or more elements of the claimed invention.

(11) *Related Proceeding(s) Appendix*

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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